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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Improvements in or relating to Coating Compositions
and the like

We, ALEX CAMERON & SONS LIMITED, a British Company, of No. 2 Hudson Road, Sunderland, County Durham, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates more particularly though not exclusively, to coating compositions and it is also concerned with liquid dispersions of zinc or zinc alloy.

When zinc dust is used, for example, as an ingredient in coating compositions as anti-corrosive coating preparations and in particular when used in admixture with an alkali silicate, the zinc dust is used in the dry state and is added to the sodium silicate as a dry powder which then has to be mixed evenly into the sodium silicate to produce the coating composition. This mixing operation is difficult to perform to produce an even consistency. This is particularly so when the mixing is done on the site as is frequently the case because of the comparatively short life of the mixture before reaction takes place.

It has long been realised that it would be preferable to have the zinc dust in some form of liquid state because it would mix more readily and homogeneously with the alkali silicate. However it has not been found possible until now to produce a suitable stable form of zinc dust suspended in a liquid medium.

An object of the present invention is to provide a liquid composition in which the zinc dust is held substantially permanently and evenly distributed throughout the liquid vehicle.

A further object of the invention is to provide an anti-corrosive coating composition which has a reasonably long life and which at the same time is simple to use and mix upon the site.

The invention consists in an aqueous sus-

pension of zinc powder or zinc alloy powder which incorporates a wetting agent and colloidal silica as a dispersing agent. The wetting agent may be an organic polyphosphate.

Other suitable wetting agents are a polycarboxylic naphthalene sulphonate polymer, naphthalene formaldehyde sulphonate acid, and anionic naphthalene formaldehyde sulphonate.

The invention has particular application to a production of zinc dust-alkali silicate mixes used as coating compositions on metal surfaces.

The aqueous dispersion in accordance with the present invention has an indefinite life and facilitates the introduction of zinc dust into a mix incorporating an alkali silicate for example sodium silicate. Conveniently the aqueous dispersion of zinc is kept separately from the sodium silicate until the mixture is required for use and then the two mixes stirred together. Both mixes being in liquid form an even distribution is obtained quickly and there is no tendency of the dust to separate out.

Conveniently the aqueous suspension of zinc dust when it is to be used as one of the ingredients in a coating composition also incorporates in addition to the organic polyphosphate or other wetting agent and the dispersing agent, a stabiliser which serves to slow down the reaction between the silicate and the zinc, and a thickener for the water. Thus in one such aqueous suspension there is incorporated a small proportion of red lead and sodium sulphide to act as stabilisers, and a proportion of carboxymethyl cellulose in the form of a 1% solution in water which acts as a thickener for the water. These ingredients are conveniently mixed in a high speed mixer to produce a stable suspension of zinc dust. One suitable agent for use in forming the aqueous suspension of zinc dust is that which is known under the Trade name of ORATAN 731. In such an aqueous suspension 70 or more part by weight of zinc

dust can be incorporated with the aid of 5 or more parts of a 33 $\frac{1}{3}$ % aqueous solution of ORATAN 731. It is believed that ORATAN 731 is a polycarboxylic naphthalene sulphonate polymer.

To form a coating composition with an aqueous suspension of the above make-up it is found that a sodium silicate mix containing 25 parts by weight of sodium silicate, 3 parts of water and 4 to 5 parts by weight of dilute hydrochloric acid combined with the aqueous suspension of zinc dust and produces a highly satisfactory coating composition which has a pot life of the order of 5 or more hours and which spreads evenly on the surface to produce a tough insoluble coating. Such coatings are particularly suitable for the protection of metal surfaces which come into contact with hydrocarbons for example petroleum and oils of all types in addition to being suitable as a coating for metal surfaces in particular ferrous surfaces to protect them from corrosion resulting from contact with sea water or other aqueous media.

The zinc powder or zinc alloy powder suspension can be mixed with the silicate hydrochloric acid solution in equal parts by weight or otherwise as desired. However the mixture should be such that the pH value is maintained from 7 to 10 since at that value the metal remains unreactive and no hydrogen is given off.

Whilst sodium silicate has been given as an example of a suitable silicate the invention is equally applicable when using potassium silicate.

To prolong the life of the combined coating composition there may be incorporated into the aqueous dispersion or into the sodium silicate mix or into the combined mix at the time of mixing such reaction inhibitors as a higher oxide for example hydrogen peroxide, lead peroxide, barium peroxide, sodium perborate, potassium chlorate, potassium periodate, manganese dioxide and sodium persulphate.

As a specific example of a suitable make-up of the zinc dust aqueous suspension the following composition is given:—

72 parts by weight of superfine zinc dust
2 parts by weight of red lead
2 parts by weight sodium sulphide
10 parts by weight of a 1% aqueous solution of carboxymethyl cellulose
5 parts by weight of a 33 $\frac{1}{3}$ % solution of ORATAN 731
1.2 parts by weight of colloidal silica.

These ingredients are agitated together in a high speed mixer until the zinc dust goes into a stable suspension.

As a suitable silicate mix to be mixed with the above aqueous suspension to produce a

coating composition the following is given:—

24 parts by weight sodium silicate
2.5 parts by weight water
3.5 parts by weight dilute hydrochloric acid.

One particular advantage of being able to provide zinc dust in an aqueous suspension state is that it can if necessary be added to the well known water emulsion paints since the aqueous suspension of zinc can be mixed with the emulsion paint to produce a homogeneous mixture in which zinc dust is evenly distributed throughout the paint. However such an aqueous suspension can be used for any other purpose where it is necessary to incorporate zinc or zinc alloy into an aqueous mix.

Whilst the invention has been described more particularly with respect to the use of an organic polyphosphate as the wetting agent, other wetting agents may be employed.

WHAT WE CLAIM IS:—

1. An aqueous suspension of zinc powder or zinc alloy powder, which incorporates a wetting agent and colloidal silica as a dispersing agent.
2. An aqueous suspension as claimed in claim 1, in which there is also incorporated a stabiliser which serves to slow down the reaction between the zinc and a silicate to which the aqueous suspension is subsequently added to form a protective coating.
3. An aqueous suspension as claimed in claim 2 in which red lead and sodium sulphide is included.
4. An aqueous suspension as claimed in any one of the preceding claims in which there is incorporated a thickener for the water, for example a 1% solution in water of carboxymethyl cellulose.
5. An aqueous suspension as claimed in any one of the preceding claims, in which the wetting agent is an organic polyphosphate.
6. An aqueous suspension as claimed in any one of claims 1 to 4, in which the wetting agent is naphthalene formaldehyde sulphonate acid.
7. An aqueous suspension as claimed in any one of claims 1 to 4, in which the wetting agent is anionic naphthalene formaldehyde sulphonate.
8. An aqueous suspension as claimed in any one of claims 1 to 4, in which the wetting agent is a poly-carboxylic naphthalene sulphonate polymer.
9. An aqueous suspension of zinc powder or zinc alloy powder substantially as described.
10. A method of preparing an aqueous suspension as claimed in any of the preceding claims comprising agitating the ingredients of the aqueous mix together in a high speed mixer until a stable suspension of the zinc

powder or zinc alloy powder is obtained.

11. A method of producing a coating composition having anti-corrosive properties comprising mixing together an aqueous suspension as claimed in any one of the preceding claims 1 to 9, with an aqueous solution containing sodium silicate and dilute hydrochloric acid.

12. A method of preparing an aqueous suspension of zinc powder or zinc alloy powder, substantially as described.

13. A coating composition comprising a mixture of an aqueous suspension of zinc powder or zinc alloy powder in accordance with any one of claims 1 to 9 together with an aqueous solution of an alkali silicate and hydrochloric acid substantially as described.

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